Shadowing and approximation in dynamical systems*

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1 Introduction

Smoothness and hyperbolicity of a mapping $f : \Omega \to \Omega \subseteq \Re^d$ implies that a C^r dynamical system, generated by f, preserves many of its structural properties under small smooth perturbations. For instance, structural stability is present for large classes of smooth hyperbolic mappings, and the Shadowing Lemma will hold.

However, complicated behaviour of the orbits of f is often investigated computationally. Then f is replaced by a *computer realization* $\tilde{f}$. This realization involves some or all of the effects of

- finite machine arithmetic;
- a computational method;
- approximate evaluation of f.

In such a situation, it is important that exact orbits can be closely modelled during computation. That is, that the orbits of f and $\tilde{f}$ are close in

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